

RECEIVED	
JUL - 7 2000	
CORRECTED FILING RECEIPT	
*****SCINTO*****	
OC00000005213628	



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: ASSISTANT SECRETARY AND
 COMMISSIONER OF PATENT AND TRADEMARKS
 Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLAIMS	IND CLAIMS
09/519,178	03/06/2000	2721	5898	1263.1194	73	98 ¹⁶⁴	38

05514
 FITZPATRICK CELLA HARPER & SCINTO
 30 ROCKEFELLER PLAZA
 NEW YORK, NY 10112

JMA *cover sheet*

Date Mailed: 06/30/2000

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Customer Service Center. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the PTO processes the reply to the Notice, the PTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Michael James Taylor, Surrey, UNITED KINGDOM;
 Simon Michael Rowe, Surrey, UNITED KINGDOM;
 Jason Peter Andrew Charlesworth, Surrey, UNITED KINGDOM;
 Philip Neil Garner, Surrey, UNITED KINGDOM;
 Jebu Jacob Rajan, Surrey, UNITED KINGDOM;

Continuing Data as Claimed by Applicant

Foreign Applications

UNITED KINGDOM 9905191.4 03/05/1999
 UNITED KINGDOM 9905197.1 03/05/1999
 UNITED KINGDOM 9905202.9 03/05/1999
 UNITED KINGDOM 9905158.3 03/05/1999

If Required, Foreign Filing License Granted 05/09/2000

Title

Image processing apparatus and database

Preliminary Class

382

BEST AVAILABLE COPY

CLAIMS

1. Apparatus for archiving data defining models of three-dimensional objects, comprising:

5 a data receiver for receiving data defining movements of the three-dimensional objects;

 a first archive data generator for generating first archive data defining where at least one object is looking; and

10 a database for storing the first archive data such that it is associated with archive data for the three-dimensional objects.

2. Apparatus according to claim 1, wherein the first
15 archive data generator is arranged to generate first archive data defining a person, animal or object at which the at least one object is looking.

3. Apparatus according to claim 1, wherein the database
20 is arranged to store archive data for the three-dimensional objects comprising data defining the movements thereof.

4. Apparatus according to claim 1, wherein the database
25 is arranged to store archive data for the three-

dimensional objects comprising data defining the three-dimensional objects in different positions.

5 5. Apparatus according to claim 1, wherein the first
archive data generator is arranged to generate respective
first archive data for data received at different times
by the receiving means, and the database is arranged to
store the first archive data associated with the
10 corresponding archive data for the three-dimensional
objects and associated with second archive data
comprising timing data.

15 6. Apparatus according to claim 1, further comprising
a third archive data generator for generating third
archive data defining text corresponding to words spoken
by one of the three-dimensional objects, and wherein the
database is arranged to store the third archive data such
that it is associated with the archive data for the
three-dimensional objects and related archive data.

20 7. Apparatus according to claim 6, wherein the third
archive data generator comprises an audio receiver for
receiving audio data and an audio data processor for
processing the audio data to generate the text data
25 therefrom.

8. Apparatus according to claim 1, wherein the data receiver means is further arranged to receive audio data, and wherein the database is arranged to store the audio data such that it is associated with the archive data for the three-dimensional objects and related archive data.

9. Apparatus according to claim 1, wherein the database is arranged to store the archive data for the three-dimensional objects as MPEG 4 data.

10. Apparatus according to claim 8, wherein the database is arranged to store the archive data for the three-dimensional objects and the audio data as MPEG 4 data.

11. Apparatus according to claim 1, further comprising a fourth archive data generator for generating fourth archive data defining, for a predetermined period, the proportion of time spend by a given three-dimensional object looking at each of other three-dimensional objects during the predetermined period, and wherein the database is arranged to store the fourth archive data such that it is associated with the archive data for the three-dimensional objects and related archive data.

12. Apparatus according to claim 11, wherein the

predetermined period comprises a period during which the given three-dimensional object was talking.

5 13. Apparatus according to claim 1, further comprising a movement data generator for processing image data from at least one camera to generate data defining movements of the three-dimensional objects.

10 14. Apparatus according to claim 1, further comprising:
a store for storing data defining three-dimensional models of the objects; and

15 a model data processor for changing the data in the store to give amended model data in dependence upon the data received by the data receiver defining movements of the objects;

and wherein the database is arranged to store the amended model data as the archive data for the three-dimensional objects.

20 15. Apparatus according to claim 1, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each part of the archive data for the three-dimensional objects which meets criteria defined in the
25 search instructions.

16. Apparatus according to claim 15, wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to the first archive data.

5

17. Apparatus according to claim 5, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each part of the archive data for the three-dimensional objects which meets criteria defined in the search instructions, and wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to any one or more of the first or second archive data.

10

15

18. Apparatus according to claim 6, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each part of the archive data for the three-dimensional objects which meets criteria defined in the search instructions, and wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to any one or more of the first or third archive data.

20

25

19. Apparatus according to claim 11 further comprising
a database searcher for searching data stored in the
database in accordance with search instructions to
identify each part of the archive for three-dimensional
5 objects which meets criteria defined in the search
instructions, and wherein the database searcher is
operable to search data stored in the database in
accordance with search criteria relating to any one or
more of the first or fourth archive data.
- 10
20. Apparatus according to claim 1, further comprising
a renderer for rendering a model of the three-dimensional
objects to generate image data showing the movements of
the objects.
- 15
21. Apparatus for generating data for archiving data
defining models of three-dimensional objects, comprising:
a receiver for receiving data defining movements of
the three-dimensional objects; and
20 a first archive data generator for generating first
archive data defining where at least one object is
looking.
- 25
22. Apparatus for searching data stored in a database
comprising data for three-dimensional objects and first

archive data defining where the objects are looking, the apparatus comprising a receiver for receiving data defining search criteria relating to the first archive data, and a database searcher for searching the data in
5 the database in accordance with the search criteria.

23. Apparatus for archiving virtual meeting data, comprising:

10 a store for storing data defining a three-dimensional model of participants in the meeting;

a receiver for receiving data defining movements of the participants;

an archive data generator for generating archive data defining where each person is looking; and

15 a database for storing the archive data linked to data defining the movements of the participants.

24. Apparatus for archiving virtual meeting data, comprising:

20 a store for storing data defining a three-dimensional model of the participants in the meeting;

a receiver for receiving data defining movements of the participants;

25 an archive data generator for generating archive data defining where each person is looking; and

a database for storing the archive data linked to data defining the three-dimensional model amended in accordance with the data defining the movements.

- 5 25. A method of archiving data defining models of three-dimensional objects, comprising:

receiving data defining movements of the three-dimensional objects;

10 generating first archive data defining where at least one object is looking; and

storing the first archive data in a database such that it is associated with archive data for the three-dimensional objects.

- 15 26. A method of generating data for archiving data defining models of three-dimensional objects, comprising:

receiving data defining movements of the three-dimensional objects; and

20 generating first archive data defining where at least one object is looking.

- 25 27. A method of searching data stored in a database comprising data for three-dimensional objects and first archive data defining where the objects are looking, comprising receiving data defining search criteria.

relating to the first archive data and searching the data in the database in accordance with the search criteria.

5 28. A method of archiving virtual meeting data, comprising:

storing data defining a three-dimensional model of participants in the meeting;

receiving data defining movements of the participants;

10 generating archive data defining where each person is looking; and

storing the archive data in a database linked to data defining the movements of the participants.

15 29. A method of archiving virtual meeting data, comprising:

storing data defining a three-dimensional model of the participants in the meeting;

20 receiving data defining movements of the participants;

generating archive data defining where each person is looking; and

25 storing the archive data in a database linked to data defining the three-dimensional model amended in accordance with the data defining the movements.

30. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out in at least one of claims 1, 21, 22, 23 and 24.

5

31. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set out in at least one of claims 25, 26, 27, 28 and 29.

10

32. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out in at least one of claims 1, 21, 22, 23 and 24.

15

33. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set out in at least one of claims 25, 26, 27, 28 and 29.

20

34. Apparatus for archiving data defining models of three-dimensional objects, comprising:

receiving means for receiving data defining movements of the three-dimensional objects;

25

means for generating first archive data defining

where at least one object is looking; and

a database for storing the first archive data such that it is associated with archive data for the three-dimensional objects.

5

35. Apparatus for generating data for archiving data defining models of three-dimensional objects, comprising:

receiving means for receiving data defining movements of the three-dimensional objects; and

10 means for generating first archive data defining where at least one object is looking.

36. Apparatus for searching data stored in a database comprising data for three-dimensional objects and first
15 archive data defining where the objects are looking, the apparatus comprising means for receiving data defining search criteria relating to the first archive data, and means for searching the data in the database in accordance with the search criteria.

20

37. Apparatus for archiving virtual meeting data, comprising:

storage means for storing data defining a three-dimensional model of participants in the meeting;

25 means for receiving data defining movements of the

participants;

means for generating archive data defining where each person is looking; and

5 database means for storing the archive data linked to data defining the movements of the participants.

38. Apparatus for archiving virtual meeting data, comprising:

10 storage means for storing data defining a three-dimensional model of the participants in the meeting;

means for receiving data defining movements of the participants;

means for generating archive data defining where each person is looking; and

15 database means for storing the archive data linked to data defining the three-dimensional model amended in accordance with the data defining the movements.

20 39. Apparatus for creating a two-dimensional (2D) moving image database, comprising:

an image data receiver for receiving 2D moving image data;

a participant identifier for identifying participants shown in the moving image data;

25 a gaze direction data provider for providing data

relating to the direction of gaze of participants in the moving image data;

a memory for storing the database; and

5 a database generator for generating in the memory a database, comprising: an image data file having a plurality of image data storage areas each storing a respective different section of the moving image data, a participants data file storing data representing the identified participants, and a viewing data file having
10 a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each storing gaze data for the section of moving image data stored in the corresponding image data storage area.

15

40. Apparatus according to claim 39, wherein the database generator is arranged to generate the database so as to provide a plurality of viewing data files each associated with a particular different one of
20 participants shown in the moving image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each storing gaze data for the associated participant for the section of moving image data stored
25 in the corresponding image data storage area.

41. Apparatus according to claim 39, further comprising
an audio data receiver for receiving audio data
corresponding to 2D moving image data, wherein the
database generator is arranged to generate the database
5 such that the database also comprises an audio file
having a plurality of audio data storage areas each
associated with a respective different one of the image
data storage areas with each audio data storage area
storing data relating to audio data associated with the
10 section of the moving image data stored in the
corresponding image data storage area.

42. Apparatus according to claim 39, further comprising
an audio data receiver for receiving audio data
15 corresponding to the 2D moving image data, wherein the
database generator is operable to generate the database
such that the database also comprises a plurality of
audio files each associated with a respective different
participant and each having a plurality of audio data
20 storage areas each associated with a respective different
one of the image data storage areas and each audio data
storage area storing data relating to audio data
associated with the corresponding image data storage
area.

25

43. Apparatus according to claim 39, further comprising a speech data receiver for receiving speech data corresponding to the 2D moving image data, the database generator being operable to generate the database such that the database also comprises a speech file having a plurality of speech data storage areas each associated with a respective different one of the image data storage areas with each speech data storage area being arranged to store data relating to words spoken by or associated with a participant in image data stored in the corresponding image data storage area.

44. Apparatus according to claim 39, further comprising a speech data receiver for receiving speech data corresponding to the 2D moving image data, the database generator being operable to generate the database such that the database also comprises a plurality of speech files each associated with a different participant and each speech file having plurality of speech data storage areas each associated with a respective different one of the image data storage areas and storing data relating to words spoken by or associated with that participant in relation to image data stored in that image data storage area.

25

45. Apparatus according to claim 39, further comprising a speech data receiver for receiving speech data corresponding to the 2D moving image data, the database generator being operable to generate the database such that the database also comprises a speech file having a plurality of speech data storage areas each associated with a respective different one of the image data storage areas with each speech data storage area storing data relating to words spoken by or associated with a participant in image data stored in the corresponding image data storage area, the database generator also being operable to generate the viewing data file such that each viewing data storage area stores data indicating which, if any, of other participants in an item of image data stored in the corresponding image data storage area is being gazed or looked at by the participant when the participant associated with the viewing data file is speaking.
46. Apparatus according to claim 45, wherein the database generator is operable to generate a viewing data file for each of a plurality of participants shown in the moving image data such that each viewing data storage area of each viewing data file stores data indicating which, if any, of other participants in an item of image

data stored in the corresponding image data storage area is being looked at by the participant associated with that viewing data file when that participant is speaking.

5 47. Apparatus according to claim 43, wherein the speech data receiver further comprises a converter for converting the audio speech data to text.

10 48. Apparatus according to claim 47, wherein the converter comprises a speech recognition data file, a speech processor for using the speech recognition data file to identify phonemes in the received audio speech data, a recognition processor for recognising words in the speech data and a writer for storing both the
15 identified phonemes and text representing the identified words in the speech data files.

20 49. Apparatus according to claim 43, wherein the speech data receiver further comprises a transcript retriever for accessing a transcript of speeches occurring in the moving image data, an identifier for identifying speeches by different participants in the transcript and a writer for storing each identified speech in the speech file of the participant responsible for that speech such that
25 each speech data storage area of that speech contains the

portion of the transcript associated with the image data stored in the corresponding image data storage area.

5 50. Apparatus according to claim 43, further comprising a histogram generator for using the speech and gaze data to generate for each speech a viewing histogram indicating the amount of time the speaker looked at each of the other participants during that speech, the database generator being operable to generate in the
10 database a respective viewing histogram file for each participant and to store the generated viewing histograms in the viewing histogram file such that each viewing histogram is associated with the speech data storage areas where the corresponding speech is stored.

15

51. Apparatus according to claim 39, wherein the participant identifier comprises a display generator for displaying a section of the moving image data to a user, an input device for enabling input to the database
20 generator by the user of data identifying the participants and an input data reader for reading the data input by the user.

25 52. Apparatus according to claim 39, wherein the gaze direction data provider comprises a display generator for

displaying the moving image data to a user, an input device for enabling the user to enter to the database generator the direction of gaze of the participants in the displayed image data and an input data reader for reading the data entered by the user.

53. Apparatus according to claim 39, wherein the image data receiver is arranged to receive video data.

54. Apparatus according to claim 53, further comprising a data compressor for causing the 2D moving image data to be stored in a compressed format in the image data file.

55. Apparatus according to claim 54, wherein the data compressor is arranged to store the 2D moving image data in MPEG format.

56. A method of creating a two-dimensional (2D) moving image database, comprising:

receiving 2D moving image data;
identifying participants shown in the moving image data;

providing data relating to the direction of gaze of participants in the moving image data; and

using a processor to generate in a memory a

5 database, comprising: an image data file having a plurality of image data storage areas each storing a respective different section of the moving image data, a participants data file storing the identified participants, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each storing gaze data for the section of moving image data stored in the corresponding image data storage area.

10

57. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each arranged to store gaze data for the section of moving image data stored in the corresponding image data storage area, the apparatus comprising:

15

20 an image data receiver for receiving 2D moving image data;

25

a participant identifier for identifying participants shown in the moving image data; and

a gaze direction data provider for providing data relating to the direction of gaze of participants in the moving image data.

5

58. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a plurality of viewing data files each associated with a particular different one of participants shown in the moving image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each arranged to store gaze data for the associated participant for the section of moving image data stored in the corresponding image data storage area, the apparatus comprising:

10

15

20

an image data receiver for receiving 2D moving image data;

a participant identifier for identifying participants shown in the moving image data; and

25

a gaze direction data provider for providing data relating to the direction of gaze of participants in the moving image data.

5 59. Apparatus according to claim 58 for providing 2D
moving image data for storage in a database structure
which also comprises an audio file having a plurality of
audio data storage areas each associated with a
respective different one of the image data storage areas
10 with each audio data storage area arranged to store data
relating to audio data associated with the section of the
moving image data stored in the corresponding image data
storage area, the apparatus further comprising an audio
data receiver for receiving audio data corresponding to
15 2D moving image data.

60. Apparatus according to claim 58, for providing 2D
moving image data for storage in a database structure
which also comprises a plurality of audio files each
20 associated with a respective different participant and
each having a plurality of audio data storage areas each
associated with a respective different one of the image
data storage areas and each audio data storage area being
arranged to store data relating to audio data associated
25 with the corresponding image data storage area, the

apparatus further comprising an audio data receiver for receiving audio data corresponding to the 2D moving image data.

5 61. Apparatus according to claim 58, for providing 2D moving image data for storage in a database structure which also comprises a speech file having a plurality of speech data storage areas each associated with a respective different one of the image data storage areas
10 with each speech data storage area being arranged to store data relating to words spoken by or associated with a participant in image data stored in the corresponding image data storage area, the apparatus further comprising a speech data receiver for receiving speech data
15 corresponding to the 2D moving image data.

62. Apparatus according to claim 58, for providing 2D moving image data for storage in a database structure which also comprises a plurality of speech files each
20 associated with a different participant and each speech file having plurality of speech data storage areas each associated with a respective different one of the image data storage areas and each arranged to store data relating to words spoken by or associated with that
25 participant in relation to image data stored in that

image data storage area, the apparatus comprising a speech data receiver for receiving speech data corresponding to the 2D moving image data.

5 63. Apparatus according to claim 57, for providing 2D
moving image data for storage in a database structure
which also comprises a speech file having a plurality of
speech data storage areas each associated with a
10 respective different one of the image data storage areas
with each speech data storage area being arranged to
store data relating to words spoken by or associated with
a participant in image data stored in the corresponding
image data storage area, and in which each viewing data
15 storage area is arranged to store data indicating which,
if any, of other participants in an item of image data
stored in the corresponding image data storage area is
being gazed or looked at by the participant when the
participant associated with the viewing data file is
20 speaking, the apparatus further comprising a speech data
receiver for receiving speech data corresponding to the
2D moving image data.

25 64. Apparatus according to claim 63, for providing 2D
moving image data for storage in a database structure
which includes a viewing data file for each of a

plurality of participants shown in the moving image data such that each viewing data storage area of each viewing data file is arranged to store data indicating which, if any, of other participants in an item of image data stored in the corresponding image data storage area is being looked at by the participant associated with that viewing data file when that participant is speaking.

65. Apparatus according to claims 61, wherein the speech data receiver comprises a converter for converting audio speech data to text.

66. Apparatus according to claim 65, wherein the converter comprises a speech recognition data file, a speech processor for using the speech recognition data file to identify phonemes in the received audio speech data, a word recogniser for recognising words in the speech data and a writer for causing both the identified phonemes and text representing the identified words to be stored in the speech data files.

67. Apparatus according to claim 61, wherein the speech data receiver comprises a transcript retriever for accessing a transcript of speeches occurring in the moving image data, an identifier for identifying speeches

by different participants in the transcript and a writer for causing each identified speech to be stored in the speech file of the participant responsible for that speech such that each speech data storage area of that speech contains the portion of the transcript associated with the image data stored in the corresponding image data storage area.

68. Apparatus according to claim 61, further comprising a histogram generator for using the speech and gaze data to generate for each speech a viewing histogram indicating the amount of time the speaker looked at each of the other participants during that speech for storage in a respective viewing histogram file in the database such that each viewing histogram is associated with the speech data storage areas where the corresponding speech is stored.

69. Apparatus according to claim 57, wherein the participant identifier comprises a display generator for displaying a section of the moving image data to a user, an input device for enabling input to the database generator by the user of data identifying the participants and an input data reader for reading the data input by the user.

70. Apparatus according to claim 57, wherein the gaze direction data provider comprises a display generator for displaying the moving image data to a user, an input device for enabling the user to enter to the database generator the direction of gaze of the participants in the displayed image data and an input data reader for reading the data entered by the user.

71. Apparatus according to claim 57, wherein the image data receiver is arranged to receive video data.

72. Apparatus according to claim 71, further comprising a data compressor for causing the 2D moving image data to be stored in a compressed format in the image data file.

73. Apparatus according to claim 72, wherein the data compressor is arranged to store the 2D moving image data in MPEG format.

74. A method of providing a two-dimensional (2D) moving image for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store

participants data, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each arranged to store gaze data for the section of moving image data stored in the corresponding image data storage area, the method comprising:

receiving 2D moving image data;

identifying participants shown in the moving image data; and

providing data relating to the direction of gaze of participants in the moving image data.

75. A method of providing a two-dimensional (2D) moving image for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a plurality of viewing data files each associated with a particular different one of participants shown in the moving image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each arranged to store gaze data for the associated participant for the section of moving image

data stored in the corresponding image data storage area,
the method comprising:

receiving 2D moving image data;

identifying participants shown in the moving image
5 data; and

providing data relating to the direction of gaze of
participants in the moving image data.

76. Apparatus for searching a database generated by
10 using apparatus in accordance with claim 39, comprising:

a search parameter receiver for receiving a first
search parameter identifying a first participant and a
second search parameter identifying a second participant
at which the first participant is looking;

15 a data file identifier for identifying in the
database a viewing data file associated with the first
participant;

a viewing data storage area identifier for
identifying within the identified viewing data file any
20 viewing data storage area storing data associating the
second participant with the first participant;

an image data storage area identifier for
identifying an image data storage area associated with an
identified viewing data storage area; and

25 a data supplier for supplying to a user details

identifying the identified image data storage area.

5 77. Apparatus according to claim 76, for searching a database, wherein the search parameter receiver is arranged for receiving a further search parameter defining text spoken by the first participant to the second participant, wherein the apparatus further comprises a speech data storage area identifier means for identifying within the speech file associated with the first participant any speech data storage area containing that speech, and wherein the image data storage area identifier is further arranged for identifying an image data storage area corresponding to an identified speech data storage area.

10

15 78. Apparatus according to claim 77, which further comprises a viewing proportion file checker for checking the viewing proportion file for the first participant for the identified speech and for disregarding any identified speeches where the amount of time the first participant looks at the second participant is less than a predetermined proportion of the duration of that speech.

20

25 79. A method of searching a database in accordance with claim 56, comprising receiving a first search parameter

identifying a first participant and a second search
parameter identifying a second participant at which the
first participant is looking; identifying in the database
a viewing data file associated with the first
5 participant; identifying within the identified viewing
data file any viewing data storage area storing data
associating the second participant with the first
participant; identifying an image data storage area
associated with an identified viewing data storage area;
10 and supplying to a user details identifying the
identified image data storage area.

80. A signal carrying processor implementable
instructions for controlling a processor to carry out the
15 steps as claimed in the method of at least one of claims
56, 74, 75 and 79.

81. A storage medium storing processor implementable
instructions for controlling a processor to carry out the
20 steps as claimed in the method of at least one of claims
56, 74, 75 and 79.

82. Apparatus for creating a two-dimensional (2D) moving
image database, comprising:
25 means for receiving 2D moving image data;

means for identifying participants shown in the moving image data;

means for providing data relating to the direction of gaze of participants in the moving image data;

5 memory means for storing the database; and

processing means for generating in the memory a database, comprising: an image data file having a plurality of image data storage areas each storing a respective different section of the moving image data, a
10 participants data file storing data representing the identified participants, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each storing gaze data for the section of
15 moving image data stored in the corresponding image data storage area.

83. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database
20 structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a viewing data file having a
25 plurality of viewing data storage areas each associated

with a respective different one of the image data storage areas and each arranged to store gaze data for the section of moving image data stored in the corresponding image data storage area, the apparatus comprising:

- 5 means for receiving 2D moving image data;
- means for identifying participants shown in the moving image data; and
- means for providing data relating to the direction of gaze of participants in the moving image data.

10

84. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to
- 15 store a respective different section of the moving image data, a participants data file arranged to store participants data, and a plurality of viewing data files each associated with a particular different one of participants shown in the moving image data and each
- 20 having a plurality of viewing data storage areas each associated with a respective different image data storage area and each arranged to store gaze data for the associated participant for the section of moving image data stored in the corresponding image data storage area,
- 25 the apparatus comprising:

means for receiving 2D moving image data;

means for identifying participants shown in the moving image data; and

5 means for providing data relating to the direction of gaze of participants in the moving image data.

85. Apparatus for searching a database generated by using apparatus in accordance with claim 39, comprising:

10 means for receiving a first search parameter identifying a first participant and a second search parameter identifying a second participant at which the first participant is looking;

means for identifying in the database a viewing data file associated with the first participant;

15 means for identifying within the identified viewing data file any viewing data storage area storing data associating the second participant with the first participant;

20 means for identifying an image data storage area associated with an identified viewing data storage area; and

means for supplying to a user details identifying the identified image data storage area.

25 86. Apparatus for archiving still image data,

comprising:

an image data receiver for receiving image data defining an input image;

5 a first archive data generator for generating first archive data defining a person or animal in the input image;

a second archive data generator for generating second archive data defining a person, animal or object at which the person or animal defined in the first
10 archive data is looking; and

a database for storing the first and second archive data such that it is associated with image data defining the input image.

15 87. Apparatus according to claim 86, further comprising a third archive data generator for generating third archive data defining text, and wherein the database is arranged to store the third archive data such that it is associated with the first and second archive data and the
20 stored image data defining the input image.

88. Apparatus according to claim 87, wherein the third archive data generator comprises an optical character recogniser for performing optical character recognition.

25

89. Apparatus according to claim 87, wherein the third archive data generator is operable to allow a user to input the text information manually.

5 90. Apparatus according to claim 86, further comprising
a fourth archive data generator for generating fourth
archive data defining information about when the input
image was recorded, and wherein the database is arranged
to store the fourth archive data such that it is
10 associated with the stored image data defining the input
image and related archive data.

91. Apparatus according to claim 90, wherein the fourth
archive data generator comprises a recording date reader
15 for performing processing to read a recording date from
the received image data.

92. Apparatus according to claim 90, wherein the fourth
archive data generator is operable to allow a user to
20 input manually the information about when the input image
was recorded.

93. Apparatus according to claim 86, wherein the first
archive data generator comprises an image recognition
25 processor for performing image recognition processing.

94. Apparatus according to claim 86, wherein the first archive data generator is operable to allow a user to input the first archive data manually.

5 95. Apparatus according to claim 86, wherein the second archive data generator is operable to allow a user to input the second archive data manually.

10 96. Apparatus according to claim 86, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each stored image which meets criteria defined in the search instructions.

15 97. Apparatus according to claim 96, wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to the second archive data.

20 98. Apparatus according to claim 97, wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to the first and second archive data.

25 99. Apparatus according to claim 96, wherein the

database searcher is operable to search data stored in the database in accordance with search criteria relating to any one or more of the first, second, third or fourth archive data.

5

100. Apparatus according to claim 86, further comprising a display for displaying an image to a user.

101. Apparatus for generating data for archiving still image data in a database, comprising:

10

an image data receiver for receiving image data defining an input image;

a first archive data generator for generating first archive data defining a person or animal in the input image; and

15

a second archive data generator for generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking.

20

102. Apparatus for searching data stored in a database comprising image data defining a plurality of still images and, for each of the still images, first archive data defining a person or animal in the input image and second archive data defining a person, animal or object

25

at which the person or animal defined in the first
archive data is looking, the apparatus comprising a
receiver for receiving data defining search criteria, and
a searcher for searching the data in the database in
5 accordance with search criteria relating to the second
archive data to identify each stored image which meets
the criteria.

103. A method of archiving still image data in a computer
10 database, comprising the steps of:

receiving image data defining an input image;

generating first archive data defining a person or
animal in the input image;

generating second archive data defining a person,
15 animal or object at which the person or animal defined in
the first archive data is looking; and

storing the first and second archive data in the
database such that it is associated with image data
defining the input image.

20

104. A method of generating data for archiving still
image data in a database, comprising:

receiving image data defining an input image;

generating first archive data defining a person or
25 animal in the input image; and

generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking.

5 105. A method of searching data stored in a database comprising image data defining a plurality of still images and, for each of the still images, first archive data defining a person or animal in the input image and
10 second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking, the method comprising receiving data defining search criteria and searching the data in the database in accordance with search criteria relating to the second archive data to identify each stored image
15 which meets the criteria.

106. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out
20 in at least one of claims 86, 101 and 102.

107. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set
25 out in at least one of claims 103, 104 and 105.

108. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out in at least one of claims 86, 101 and 102.

5

109. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set out in at least one of claims 103, 104 and 105.

10

110. Apparatus for archiving still image data, comprising:

means for receiving image data defining an input image;

15

means for generating first archive data defining a person or animal in the input image;

means for generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking; and

20

a database for storing the first and second archive data such that it is associated with image data defining the input image.

25

111. Apparatus for generating data for archiving still image data in a database, comprising:

means for receiving image data defining an input image;

means for generating first archive data defining a person or animal in the input image; and

5 means for generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking.

112. Apparatus for searching data stored in a database
10 comprising image data defining a plurality of still images and, for each of the still images, first archive data defining a person or animal in the input image and second archive data defining a person, animal or object
15 at which the person or animal defined in the first archive data is looking, the apparatus comprising means for receiving data defining search criteria and means for searching the data in the database in accordance with search criteria relating to the second archive data to identify each stored image which meets the criteria.

20

113. Apparatus for generating a database structure, comprising a memory for storing data and a processor operable to generate in the memory a database structure comprising: an image data file having a plurality of
25 image data storage areas each arranged to store a

respective different item of image data; a participants data file arranged to store data identifying participants shown in image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and being arranged to store data relating to the direction in which a participant shown in an item of image data stored in the corresponding image data storage area is looking.

10

114. Apparatus according to claim 113, wherein the processor is operable to generate in the database structure a plurality of viewing data files each arranged to be associated with a particular different one of participants shown in the image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each being arranged to store data indicating which, if any, of the other participants the participant associated with that viewing data storage area is looking at in an item of image data stored in the corresponding image data storage area.

15

20

115. Apparatus according to claim 113, wherein the participants are people.

25

116. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises an audio file having a plurality of audio data storage areas each associated with a respective different one of the image data storage areas with each audio data storage area being arranged to store data relating to audio data associated with the corresponding image data storage area.

10

117. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a plurality of audio files each arranged to be associated with a respective different participant and each having a plurality of audio data storage areas each associated with a respective different one of the image data storage areas and each audio data storage area being arranged to store data relating to audio data associated with the corresponding image data storage area.

20

118. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a speech file having a plurality of speech data storage areas each

25

associated with a respective different one of the image data storage areas with each speech data storage area being arranged to store data relating to words spoken by or associated with a participant in an item of image data stored in the corresponding image data storage area.

119. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a plurality of speech files each associated with a particular different participant and each speech file having plurality of speech data storage areas each associated with a respective different one of the image data storage areas and being arranged to store data relating to words spoken by or associated with that participant in relation to an image stored in that image data storage area.

120. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a speech file having a plurality of speech data storage areas each associated with a respective different one of the image data storage areas with each speech data storage area being arranged to store data relating to words spoken by

or associated with a participant in an item of image data stored in the corresponding image data storage area and to generate the viewing data file such that each viewing data storage area is arranged to store data indicating which, if any, of other participants in an item of image data stored in the corresponding image data storage area is being looked at by the participant when the participant associated with the viewing data file is speaking.

10

121. Apparatus according to claim 120, wherein the processor is operable to generate a viewing data file for each of a plurality of participants shown in the image data with each viewing data storage area of each viewing data file being arranged to store data indicating which, if any, of other participants in an item of image data stored in the corresponding image data storage area is being looked at by the participant associated with that viewing data file when that participant is speaking.

15

20

122. Apparatus according to claim 118, wherein the processor is operable to generate the database structure such that the database structure also comprises at least one viewing proportion file arranged to store data relating to the amount of time an associated participant

25

looks at each of a plurality of other participants while that participant is speaking.

5 123. Apparatus according to claim 118, wherein the processor is operable to generate the database structure such that the speech is arranged to be stored as text.

10 124. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that each image data storage area is arranged to store at least one frame of image data.

15 125. Apparatus according to claim 113, wherein the image data file is arranged to store image data having sound data associated therewith.

20 126. Apparatus for generating a database, comprising a memory and a processor operable to generate in the memory a database comprising: an image data file having a plurality of image data storage areas each storing a respective different item of image data; a participants data file storing data identifying participants shown in the image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different

25

one of the image data storage areas and storing data identifying the direction in which a participant shown in the item of image data stored in the corresponding image data storage area is looking.

5

127. A database structure comprising: an image data file having a plurality of image data storage areas each arranged to store a respective different item of image data; a participants data file arranged to store data identifying participants shown in image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and being arranged to store data identifying the direction in which a participant shown in the image represented by an item of image data stored in the corresponding image data storage area is looking.

15

128. A database comprising: an image data file having a plurality of image data storage areas each storing a respective different item of image data; a participants data file storing data identifying participants shown in the image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different

20

25

one of the image data storage areas and storing data identifying the direction in which a participant shown in the image represented by the item of image data stored in the corresponding image data storage area is looking.

5

129. A signal carrying a database structure in accordance with claim 127 or a database in accordance with claim 128.

10

130. A data storage medium storing a database structure in accordance with claim 127 or a database in accordance with claim 128.

15

131. A method of generating a database, comprising the steps of causing a processor to generate in a memory a database comprising; an image data file having a plurality of image data storage areas each storing a respective different item of image data; a participants data file storing data identifying participants shown in the image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and storing data identifying the direction in which a participant shown in the image represented by the item of image data stored in

20
25

the corresponding image data storage area is looking.

5 132. Apparatus for searching a database in accordance with claim 128, comprising a receiver for receiving a first search parameter identifying a first participant and a second search parameter identifying another person at whom the first participant is looking; a viewing data file identifier for identifying in the database a viewing data file associated with the first participant; a viewing data storage area identifier for identifying within the identified viewing data file any viewing data storage area storing data associating the second participant with the first participant; an image data storage area identifier for identifying an image data storage area associated with an identified viewing data storage area; and a data supplier for supplying to a user details identifying the identified image data storage area.

20 133. A signal carrying processor implementable instructions for controlling a processor to carry out the steps as claimed in the method of claim 131.

25 134. A storage medium storing processor implementable instructions for controlling a processor to carry out the

steps as claimed in the method of claim 131.

ABSTRACTIMAGE PROCESSING APPARATUS AND DATABASE

5 Three-dimensional computer model data, moving image data
or still image data showing at least one person is stored
in an archive database 126, 703, 850, 1303, together with
additional information to improve the searching and
retrieval of data therefrom. The additional information
includes view parameter data 512, 1040 which defines at
10 whom or what each person is looking during each
predetermined period of time or image. Text data 504,
1020 which comprises words associated with the person,
and viewing histogram data 540 which, for each period of
text data defines the percentage of time that the
15 speaking person spent looking at each other person or
object, may also be stored.

(FIGURE 36B)

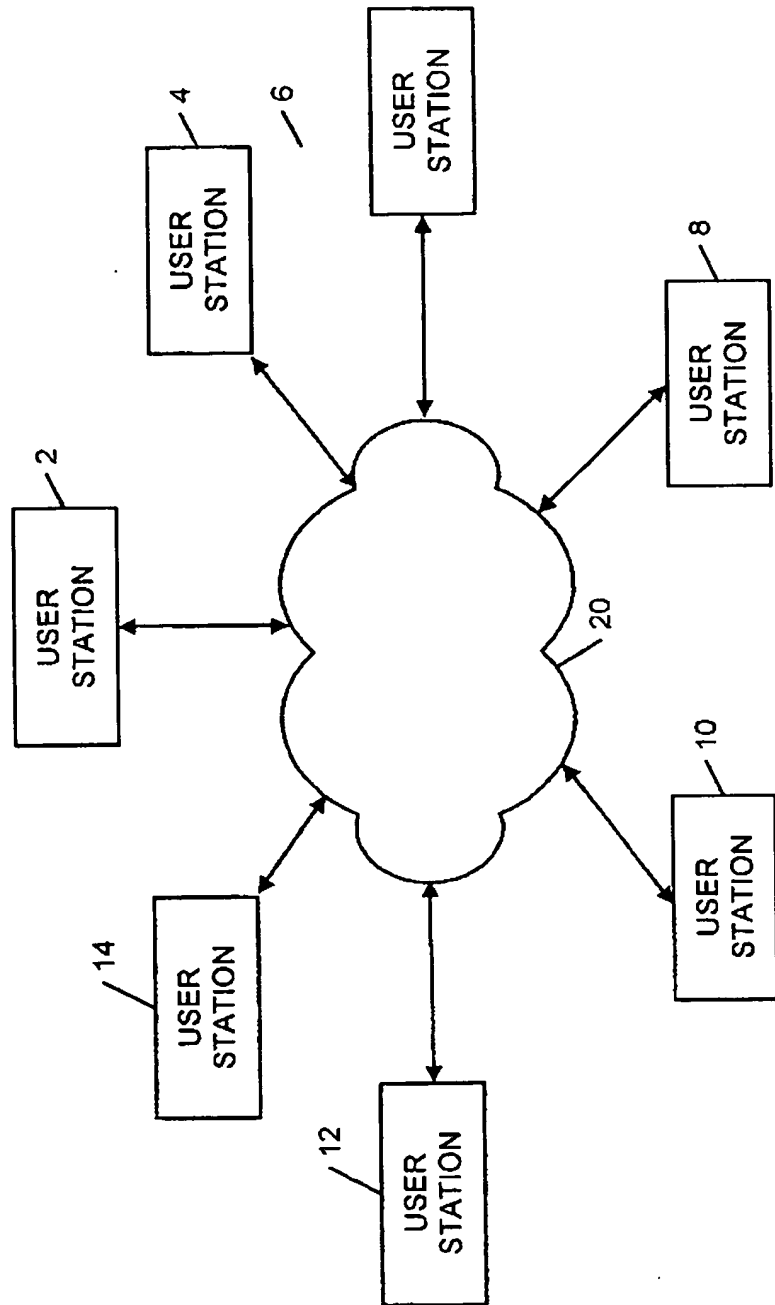
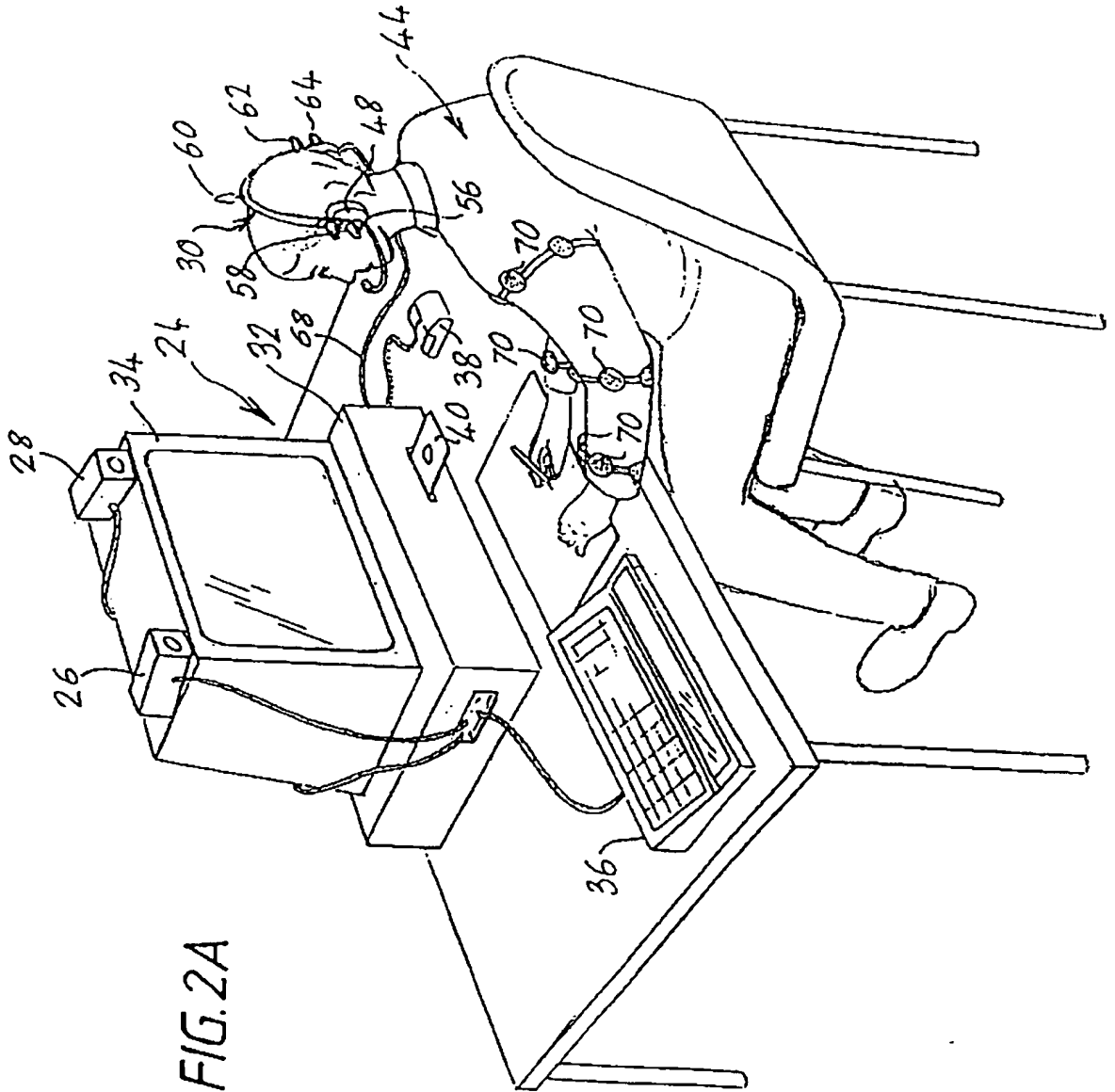


FIG. 1



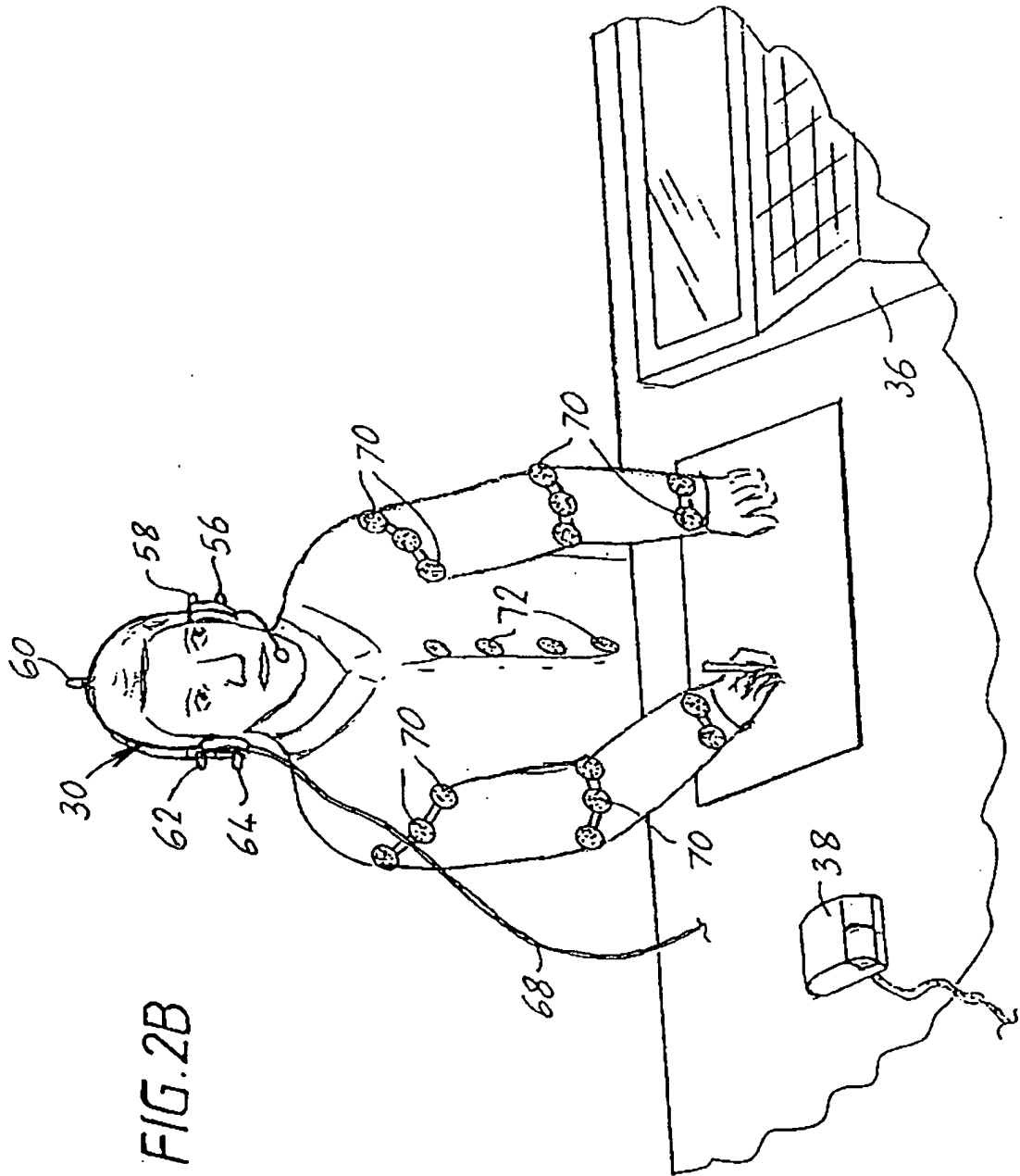


FIG. 2C

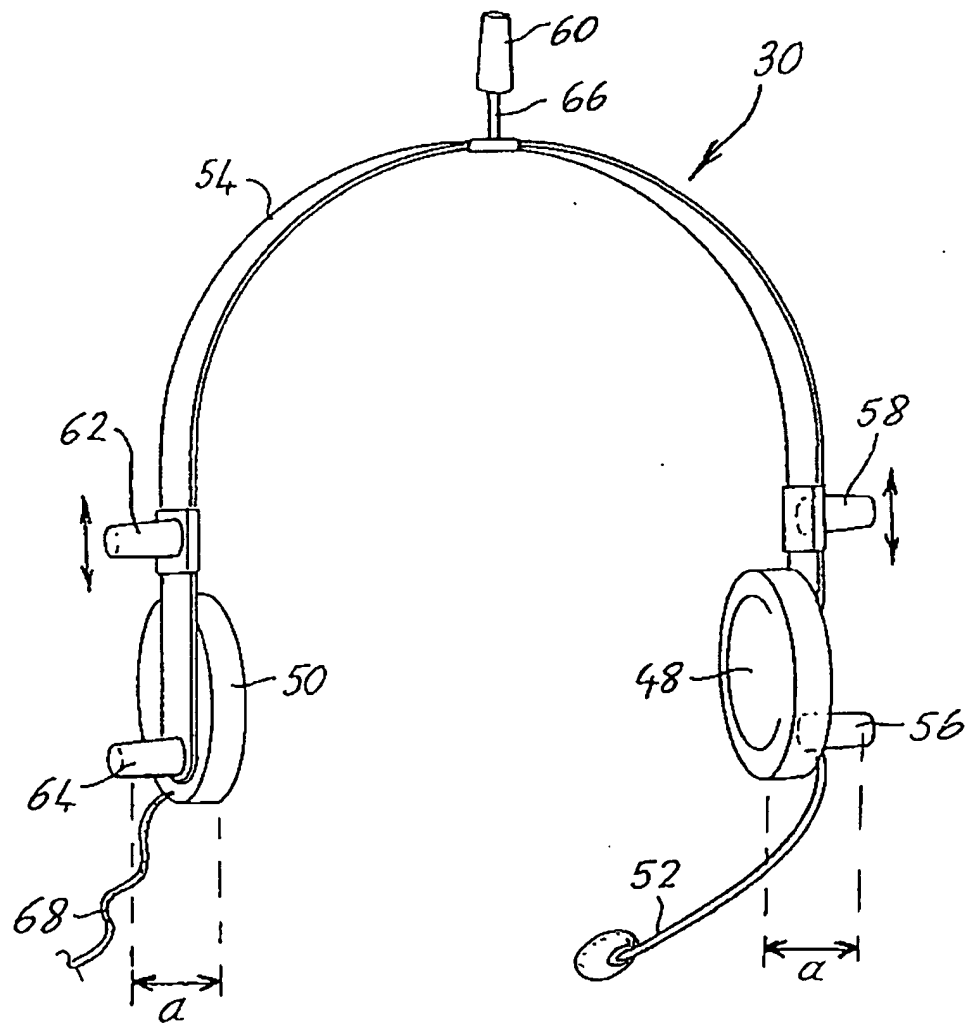
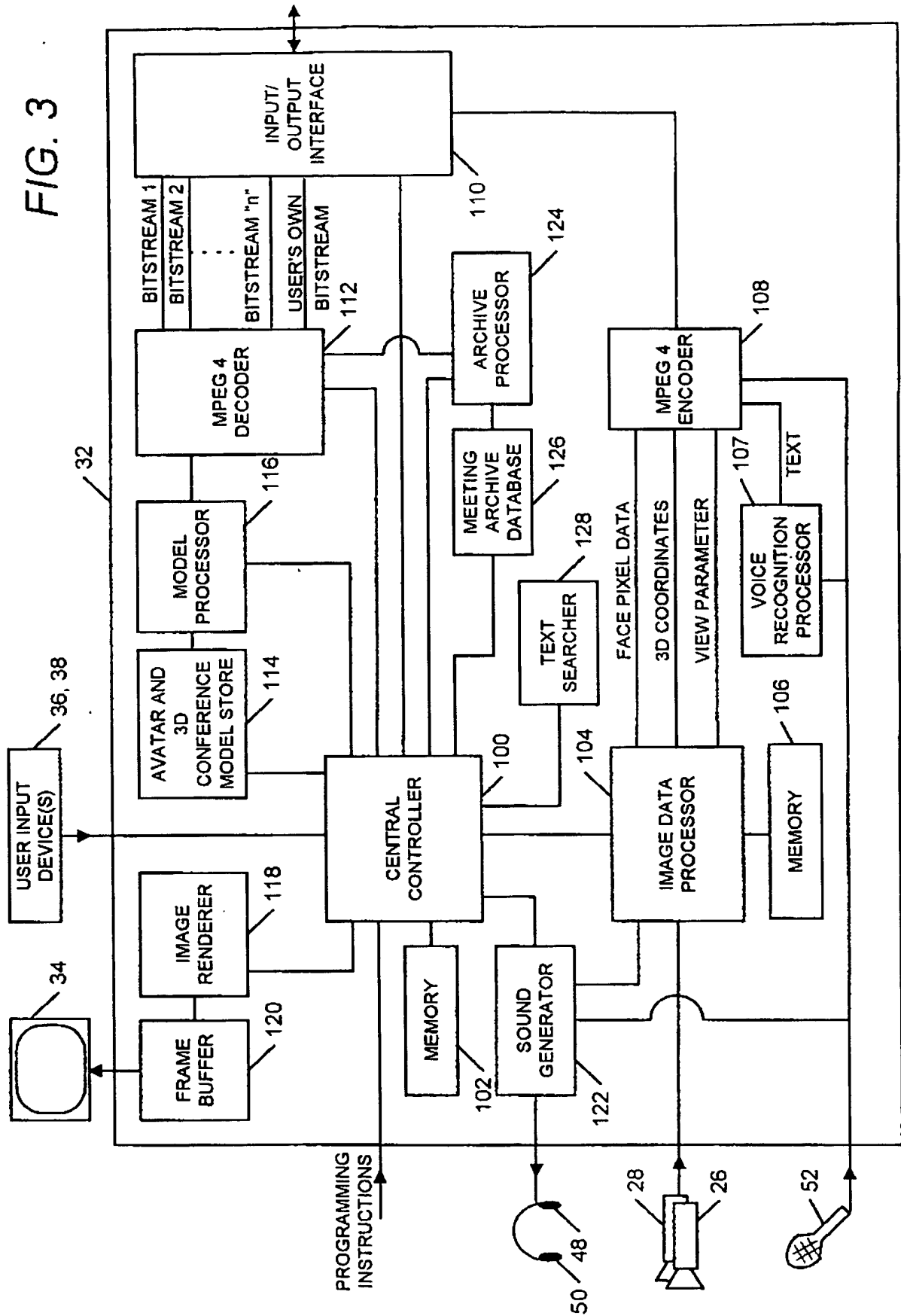
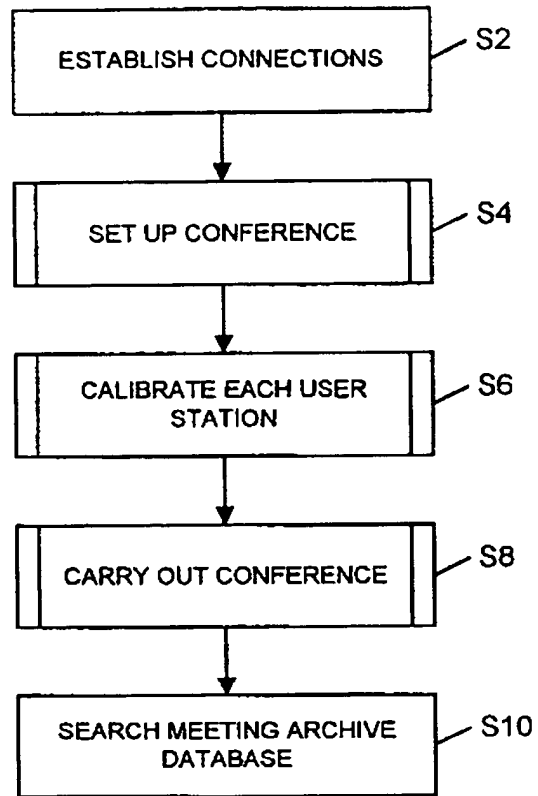


FIG. 3



*FIG. 4*

7/73

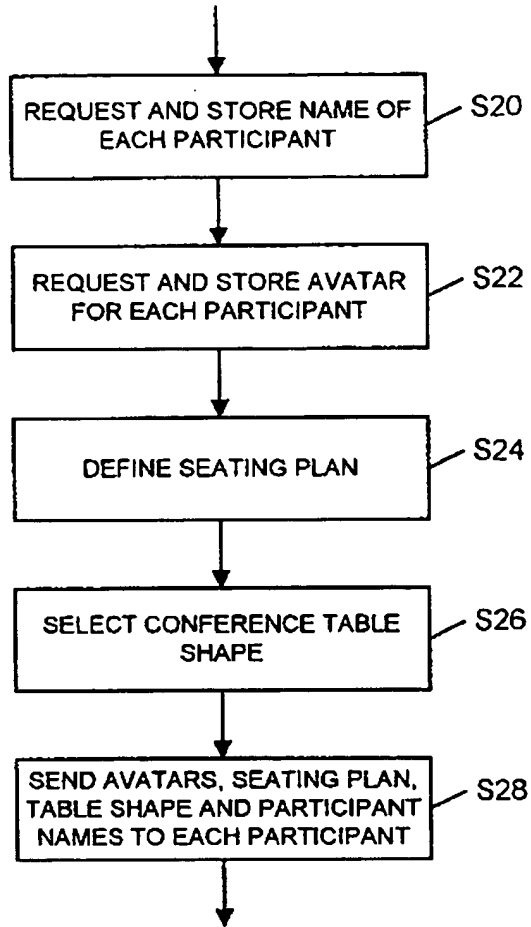


FIG. 5

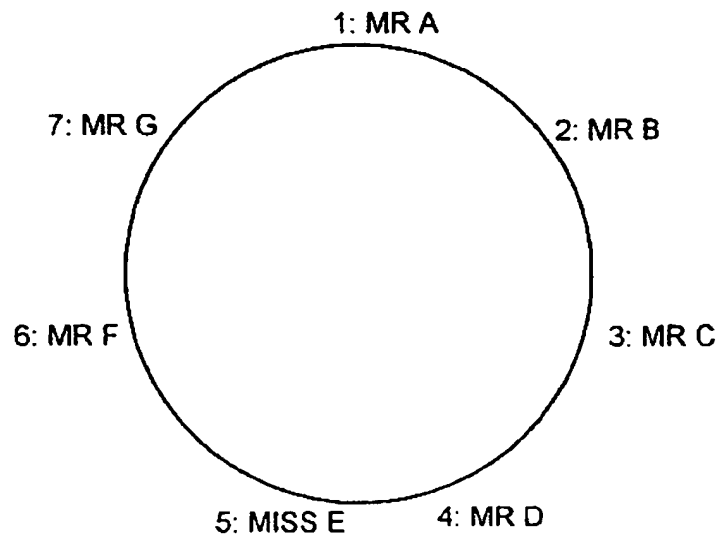


FIG. 6

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER: _____**

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.